TEACHING TOPICS

FLIPPING THE CLASSROOM

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This teaching topic is about "Flipping the Classroom" – a pedagogical method that starts by exposing students to new material outside class, usually through videos and readings. The teacher then uses class time to assimilate the knowledge through comprehensive learning situations[3].

WHAT IS A FLIPPED CLASSROOM?

A flipped classroom is a situation in which theoretical information transferred from the teacher to students is taken out of the lectures and presented as material to be used for preparation before the lecture[6]. In the lecture, the teacher can discuss important questions about the material and assess the students' level of understanding. These discussions can take place between teacher and student, as well as between students through peer discussion. When students discuss the material in pairs or in groups, the teacher can use tools during the lecture to determine whether they understand the material. Examples of such tools include demonstration/ presentation moments, online voting tools to have students answer several questions, and formative multiple-choice tests. The information that these assessment tools obtain from students can provide teachers with insight into aspects of the materials that need more explanation.

WHY SHOULD YOU USE FLIPPED CLASSROOM IN YOUR EDUCATIONAL PROGRAMME?

Flipped classrooms enable teachers to spend more time on interactive learning activities in class, leading to significant learning gains for students relative to traditional lectures[2, 5]. Studies have demonstrated that students score significantly better on tests, projects and homework assignments in flipped environments. Students apparently benefit from receiving feedback from their peers and instructors during in-class time[2]. Such feedback allows them to correct their misconceptions and reflect on their own learning[3].

WHY VIDEO?

According to Bishop and Verleger[2],

"video lectures are as effective as in-person lectures at conveying basic information."

For this reason, some teachers experiment with creating video lectures, micro-lectures, pencasts, screencasts or event recordings of their 'traditional lectures', which introduce students to the materials. These videos consist primarily of basic information, and they tend to focus on the types of learning represented at the lower levels of Bloom's taxonomy (*Figure 1*[1]). The goal for students is to remember and understand the content before the lecture, so that in-class activities can focus on learning at the higher levels of Bloom's taxonomy. In other words, in-class activities should focus on helping students to achieve deep learning[3].

Additional information about the various video tools (video lectures, micro-lectures, pencasts, screencasts and event recordings) is available here.

utwente.nl/en/telt/themes/Videoproduction/

Henk van der Kolk[7]

Click here for a video in which students express their opinions about the micro-lectures and the idea of flipping the classroom.

tinyurl.com/KolkMicrolecture

HENK VAN DER KOLK (BMS)

Henk van der Kolk is an associate professor in the Department of Research Methodology, Measurement and Data Analysis (DMO) in the faculty of BMS. As a teacher, Henk noticed that students had difficulty following his traditional lectures, paying attention and reproducing the knowledge that they had learned after the lecture. This is what led Henk to become interested in the idea of flipping the classroom, with students preparing themselves before coming to class (e.g. through micro-lectures and literature). This idea would eventually give him the opportunity to address the material at greater depth with the students.

In collaboration with the *TELT (Technology Enhanced Learning & Teaching)* team, Henk drafted an action plan and developed his traditional lectures into micro-lectures. Henk explains:

"When you start thinking about what you want to tell and students to remember in advance, it is relatively easy to construct the micro-lectures."

As a starting point, Henk divided his traditional lectures into pieces, assigned a concept title to each part and composed underlying subjects and learning goals related to each of these concepts. He then prepared a script covering each concept in 10-minute fragments. According to Henk,

"The most difficult part in this process is being very critical in selecting what you want to tell the students. You need to be constantly aware of what you want to teach the students and what you expect from them after the micro-lecture."

In a flipped-classroom setting, in-class time is intended to help students learn at a higher level in Bloom's taxonomy (*Figure 1*). It becomes a moment in which students can apply, analyse, evaluate and create new knowledge and skills under the guidance of the teacher. Henk notes:

"One major advantage of this setting is that it allows you to interact with the students at a higher level. It also transforms students into critical thinkers, and it allows the teacher to help them correct any misconceptions."

This is also one of the aspects that Henk would like to elaborate further; frequent feedback for students, with the goal of monitoring and promoting their learning and development.

BLOOM'S TAXONOMY

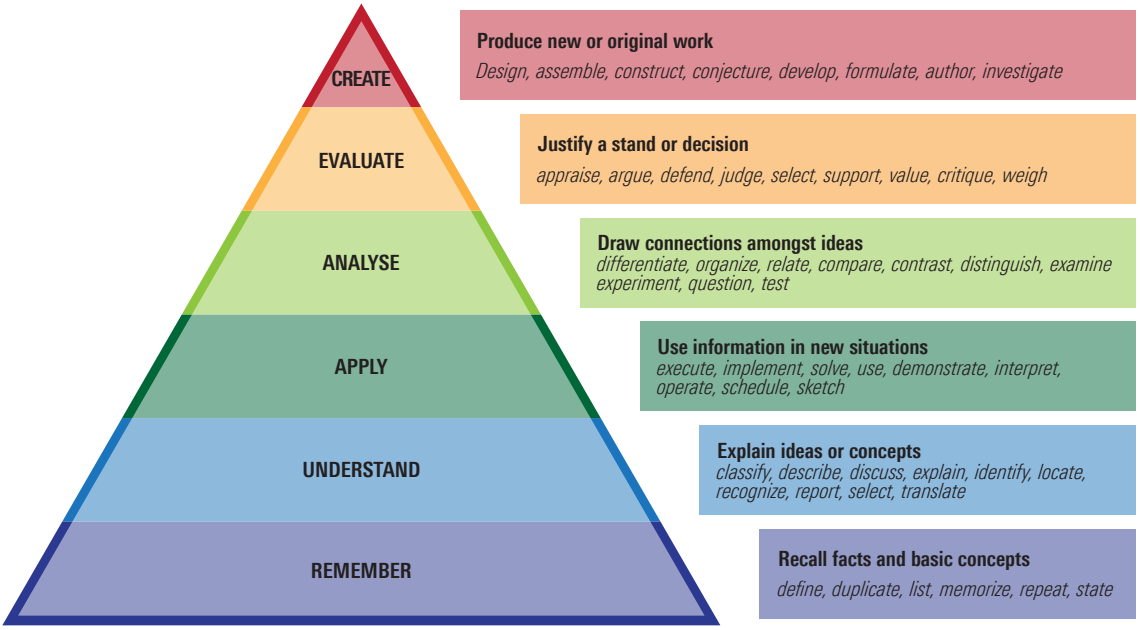

Figure 1. Blooms taxonomy. Adapted from[1].

'FLIPPED MATH' PILOT PROJECT IN THE MECHANICAL ENGINEERING EDUCATIONAL PROGRAMME

In the mathematics courses of the UT Mechanical Engineering educational programme, a flipped-classroom setting was used to help students become more actively involved from the start of the module. In general, students tend to read and learn the material just before the exam, as it is not required for the completion of their projects. This pilot project took place in the fourth quartile of the first year of the mechanical engineering programme, with 102 students participating.

SETUP OF THE PILOT PROJECT

The original setup consisted of one-week lectures for all students of science and engineering, along with one weekly tutorial for each specific educational programme. In contrast, in the pilot setup *(Figure 2)*, students did not attend mathematics lectures, but were required to prepare themselves through readings, instructional videos, practice assignments and instructions from the lecturer. During a *question-and-answer session*, the students had the opportunity to ask any questions they might have about the materials. After this session, the tutorials provided an opportunity to practice with assignments under the supervision of a lecturer. Instead of a summative interim test (as is customary in the traditional setting), a diagnostic test was used as an opportunity to provide students with feedback on their progress and understanding of the subject matter.

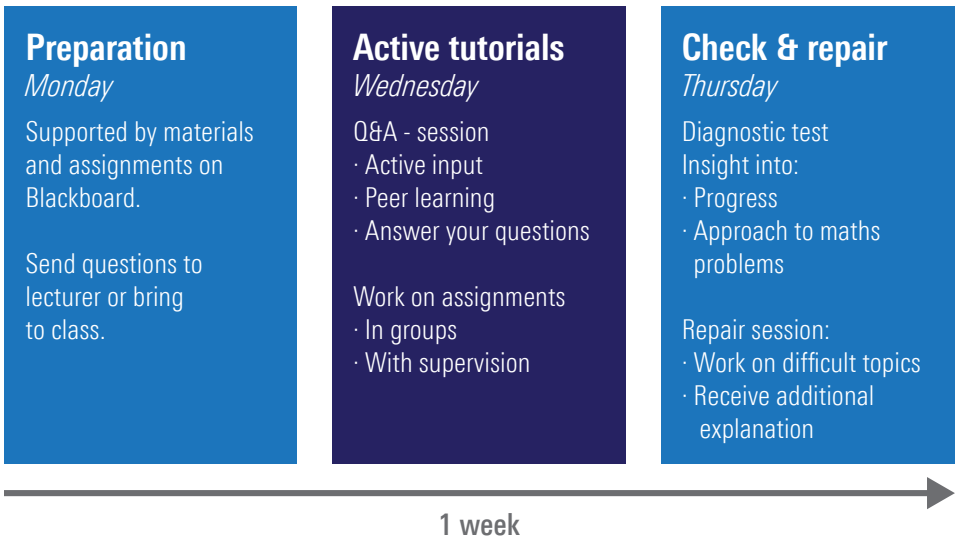

Figure 2. Setup of the pilot project.

EVALUATION & RESULTS

The pilot project was evaluated through observations, interviews, surveys at various points during the course, analysis of Blackboard log files and a panel discussion with students. Unfortunately, the evaluation results indicated that a substantial number of the students had not been actively involved in the self-study activities, and active class participation decreased during the module. Students explained that exams and resits from the previous period had interfered with the mathematics course. In addition, the students were not yet familiar with the notion of flipping the classroom, which called for them to be more actively engaged than they were accustomed to in traditional settings. In the new setting, the students were expected to find out more on their own. Not all students appreciated this feature, as they perceived a high workload and missed the traditional lectures. However, some students also mentioned advantages, including being more actively engaged in the subject matter, gaining greater insight into the subject matter and having the freedom to work independently and at their own pace. Previous studies have revealed similar effects associated with the implementation of flipped-classroom settings[6]. Although students who participate actively seem to benefit from the setting, it is a major challenge to get every student on board without imposing rules and regulations obliging them to take responsibility.

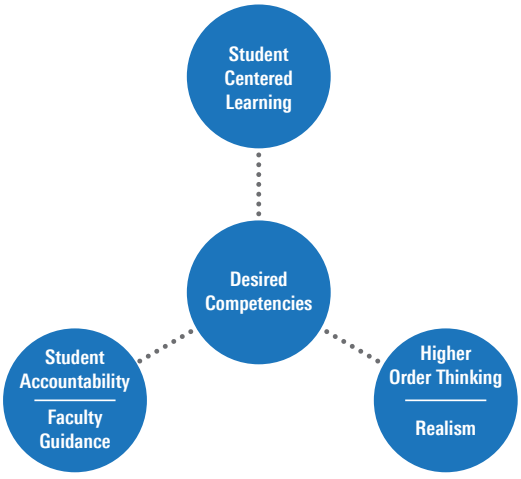

Figure 3. Flipped classroom components. Adapted from[4].

"Flipping requires that we help students build a foundation of competency before they engage the classroom experience."

TIPS

Beforehand

· Make sure that the other courses or module components within the quartile/module follow the same approach with regard to self-responsibility and interim assessments. This will prevent 'competition' for student effort.
· Make high-quality videos (students like to see one of their own teachers). For support, you can contact the TELT team: *www.utwente.nl/telt*.
· Refer to specific pages and resources (e.g. in the micro-lectures).
· Formulate your learning goals specifically, and make them transparent to students *(Henk van der Kolk)*.
· Draft a clear, logical schedule of preparation, in-class moments and assessments.

Start

· Explain what flipping the classroom is and how it works.
· Be clear about your expectations regarding independent and active study behaviour.
· Start with a less open set-up in order to help students get started.

During

· Spread the study load.
· Work with small groups of students.
· Give students an active role.
· Use methods and tools that support active participation (e.g. group discussion). For tools and methods, consult *www.utwente.nl/celt* and *www.utwente.nl/telt.*

THREE POSSIBLE TEACHING ACTIVITIES IN A FLIPPED CLASSROOM[4]

1 Students are assigned to write down the three most important aspects of each chapter on a note card and bring these note cards to class. The lecture will start with students sharing the cards. Students divide themselves into groups of approximately three and discuss the aspects indicated on the note card. Students are assigned to explain why they chose to indicate these specific aspects and to provide each other with feedback. This activity can also be done online (e.g. in a discussion forum).

2 Students are assigned to complete a case study after reading one or more chapters. Each week, the teacher provides feedback to the entire class. After students have submitted case studies for several weeks, the teacher randomly selects one case study from each student to assess.

3 Students are assigned to take an online quiz before coming to class. The quiz consists of 20 questions out of a pool of 50. Students must answer 80% of the questions correctly in order to attend the class. The teacher uses the item analysis from the quiz to focus and elaborate on aspects that many students answered incorrectly during class time.

ARE YOU INTERESTED IN FLIPPING YOUR CLASSROOM?

Are you enthusiastic about flipping the classroom, and would you like to try it? The CELT team can help you!

www.utwente.nl/celt

Click here to see which of the educational advisors supports your faculty.

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